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EXAMINER
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BARROW, AMANDA J

ART UNIT	PAPER NUMBER
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1795

NOTIFICATION DATE	DELIVERY MODE
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04/30/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/539,000	<b>Applicant(s)</b> MURAMATSU ET AL.	
	<b>Examiner</b> AMANDA BARROW	<b>Art Unit</b> 1795	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 April 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 13-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 13-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/15/05, 8/5/05, 11/30/05, 6/14/06, 9/26/07, 9/23/08</u>      | 6) <input type="checkbox"/> Other: _____                          |
| <u>and 12/5/08.</u>  |   |



**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 13, 14, and 31 are also rejected under 35 U.S.C. 102(b) as being clearly anticipated by Miyamoto et al. (US patent 7,374,832 B2) (hereinafter “Miyamoto”).

Regarding claim 13, Miyamoto teaches a direct methanol fuel cell system comprising an aqueous solution container 12 storing a methanol aqueous solution, a fuel cartridge 15 (“fuel tank”) storing methanol fuel to be supplied to the aqueous solution tank and a fuel cell stack supplied with the methanol aqueous solution from the methanol aqueous solution container for generating electric energy through electrochemical reaction (column 5, lines 59-67 and column 6). Miyamoto also teaches that the fuel tank and aqueous solution tank are disposed above the fuel cell stack as illustrated by Figure 1.

Regarding claim 14, Miyamoto also teaches a gas feed pump disposed below the fuel cell stack and arranged to supply the fuel stack with air containing oxygen (column 5, lines 59-67 and column 6).

Regarding claim 31, Miyamoto teaches that the fuel cell stack is arranged at a bottom portion of the direct methanol fuel cell system.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 13-21 and 25-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Surampudi et al. (JP Patent Application 11-510311 A ) (hereinafter “Surampudi”).

Regarding claim 13, Surampudi teaches a direct supply type methanol fuel cell comprising a circulation tank 906 (“aqueous solution tank”) that stores a methanol aqueous solution, a methanol tank (“fuel tank”) that stores methanol to be supplied to the circulation tank 906 (“aqueous solution tank”), a fuel cell stack 924 that is supplied with the methanol aqueous solution from the circulation tank 906 (“aqueous solution tank”) for generating electric energy through electrochemical reactions ( pages 22-23 of translation). Surampudi also teaches that the circulation tank 906 is disposed mostly above the fuel cell stack 924 as is illustrated in Figure 9.

Even though the circulation tank 906 is not entirely above the fuel cell stack 924, this would be an example of an obvious rearrangement of parts (see MPEP 2144.04). By placing the tank above the fuel cell, this allows for gravity to move the aqueous fuel from the circulation tank to the fuel cell stack enabling a more efficient system. Therefore, it would have been obvious to one of ordinary skill in the art to dispose the fuel tank and the solution tank above the fuel cell stack, because one of ordinary skill in the art would recognize the use of gravitational force to dispense the liquid into the fuel cell stack without a pump.

Regarding claim 14, Surampudi teaches a compressor 26 of oxygen or air that supplies oxygen or air to the cathode. This is illustrated in Figure 2 and the compressor 2 is shown disposed mostly below the fuel cell stack 10 (page 4, lines 13-14). The compression equipment 930 which includes the compressor 26 is also illustrated in Figure 11 and is shown disposed mostly below the fuel cell stack 924.

Again, even though the compression equipment 930/compressor 26 is disposed only "mostly below" the fuel cell stack, it is within the ambit of a person of ordinary skill in the art to rearrange these parts so that it was completely below and is thus rendered obvious (see MPEP 2144.04). In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950).

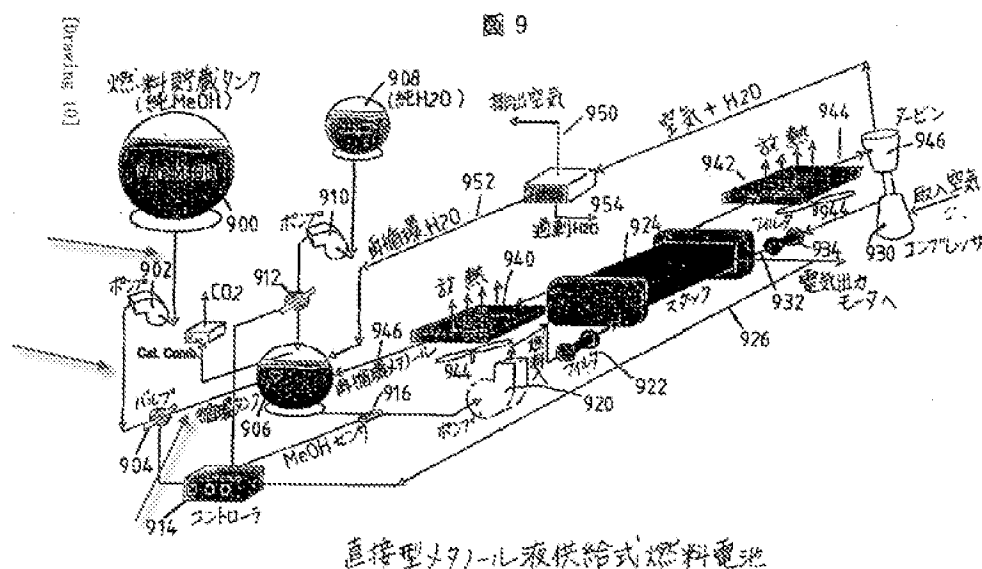
Regarding claim 15, Surampudi does not recite that the methanol tank 900 and the circulation tank 906 ("aqueous solution tank") are disposed side by side or at a common height; however, it is within the ambit of a person of ordinary skill to rearrange these parts in such a manner and is thus rendered obvious (see MPEP 2144.04). Surampudi does teach a first pipe extended downward from the fuel tank illustrated in Figure 9 and a second pipe extending downward from the aqueous solution tank, and a fuel pump 902 disposed below the methanol

Art Unit: 1795

tank that is arranged to pump the methanol to the aqueous solution tank. Surampudi does not teach that the fuel pump is disposed below the aqueous solution tank that is connected via the second pipe or that the fuel pump is arranged to pump the methanol fuel supplied from the fuel tank via the first pipe to the aqueous solution tank via the second pipe as recited in the claim.

However, if the system is rearranged so that the methanol tank 900 and the circulation tank 906 are side by side, the first and second pipes and pump could also be rearranged in this manner which is within the ambit of a person of ordinary skill in the art and is thus rendered obvious (see MPEP 2144.04).

Regarding claim 16, Surampudi teaches that the methanol tank 900 is disposed above the circulation tank 906 ("aqueous solution tank") as is illustrated in Figure 9, and that a pipe connects the methanol tank 900 and the circulation tank 906 as shown below:



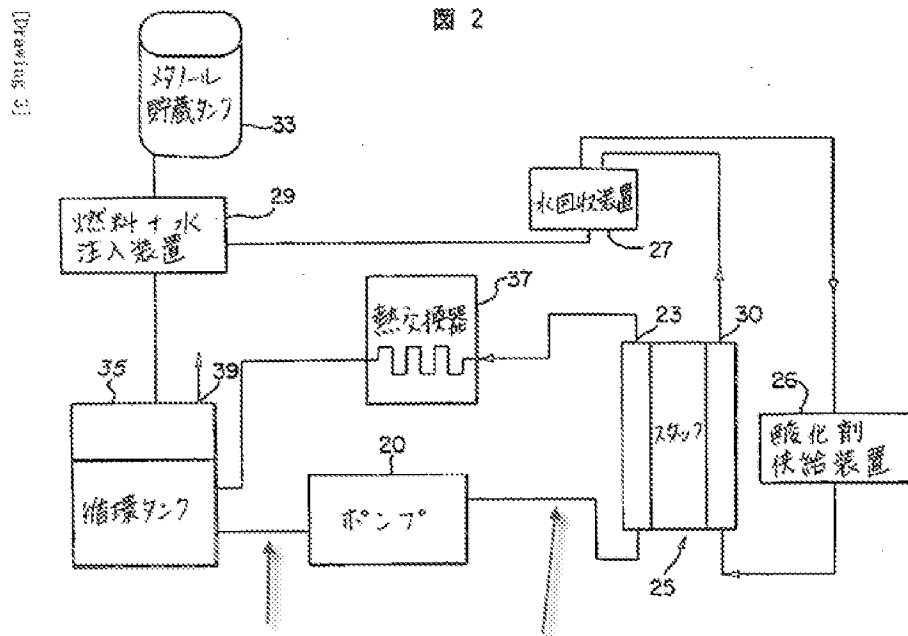
Also, a valve 904 is disposed in the pipe that is arranged to open and close (pages 22 and 23).

Regarding claim 17, Surampudi teaches a heat exchanger 37 that is arranged to perform a heat-exchanging operation on the methanol aqueous solution outputted from the circulation tank 35 ("aqueous solution tank") before being sent to the fuel cell stack 30. The methanol aqueous solution will go through the fuel cell stack first on the very first run; however, every run after this it is shown that the methanol aqueous solution goes through the heat exchanger before being sent to the fuel cell stack 7. The reference numbers used here are in reference to Figure 2 which also illustrates that the heat exchanger 37 is disposed on a side of the fuel cell stack 7. The description of Figure 2 is not given in the English translation, and thus the numbers in the figures were translated by a USPTO translator.

Regarding claim 18, Surampudi teaches that the carbon dioxide generated is taken out through the exit 23 with the solution of fuel and water and is separated by a gas liquid separation device (not illustrated). Subsequently the solution of fuel and water is recycled into a cell with the pump 20 (page 6, lines 8-11). Surampudi also teaches that the water conveyed through a solid-electrolyte membrane is condensed within a water recovery system and is sent to a water tank (page 7, lines 26-29). Lastly, because of the description given, the gas-liquid separator which isn't illustrated must be disposed between the fuel cell stack 7 and the heat exchanger 37.

Regarding claim 19, Surampudi illustrates in Figure 2 that the heat exchanger 37 includes a heat exchange pipe arranged to guide the methanol aqueous solution outputted from the circulation tank 35 ("aqueous solution tank") to the fuel cell stack. This is shown below with arrows pointing to the heat exchange pipe.





A gas-liquid separation pipe that guides the moisture content discharged from the fuel cell stack to the water tank is not recited; however, it is inherent to the system that such a pipe exists as Surampudi teaches that the water conveyed through a solid-electrolyte membrane is condensed within a water recovery system and is sent to a water tank (page 7, lines 26-29). As the same structure is taught by Surampudi for all other constituents of the system, it would also be inherent that the gas-liquid separation pipe would be arranged to face at least part of the heat exchange pipe. Even if the gas-liquid separation pipe was arranged so as not to face at least part of the heat exchange pipe, it would be within the ambit of a person of ordinary skill in the art to rearrange the parts in this way and is thus rendered obvious (See MPEP 2144.04).

Regarding claim 20, Surampudi teaches an air pump teaches a compressor 26 of oxygen or air that supplies oxygen or air to the cathode. This is illustrated in Figure 2 and the

Art Unit: 1795

compressor 2 is shown disposed mostly below the fuel cell stack 10 (page 4, lines 13-14). The compression equipment 930 which includes the compressor 26 is also illustrated in Figure 11 and is shown disposed mostly below the fuel cell stack 924. Again, even though the compression equipment 930/compressor 26 is disposed only "mostly below" the fuel cell stack, it is within the ambit of a person of ordinary skill in the art to rearrange these parts so that it was completely below and is thus rendered obvious (See MPEP 2144.04).

Surampudi also teaches a prime controller 914 that controls the operation of the entire system including the concentration of the methanol aqueous solution outputted from the circulation tank 906 ("aqueous solution tank") to the fuel cell stack 924. The methanol sensor 916 detects the methanol concentration in the circulation tank and the control device 914 controls the operation of the system based on this information. (page 22, last paragraph, page 23, first paragraph). Surampudi does not recite whether or not the controller is disposed on a side of the air pump or if the heat exchanger and the gas-liquid separator are arranged to be opposed to the controller and to sandwich the air pump, as recited in the claim; however, as all constituents of the claims are recited by Surampudi, it is within the ambit of a person of ordinary skill in the art to arrange the parts in this manner.

The Supreme Court decided that a claim can be proved obvious merely by showing that the combination of known elements was obvious to try. In this regard, the Supreme Court explained that, "[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has a good reason to pursue the known options within his or her technical grasp." Therefore, choosing from a finite number of identified, predictable solutions, with a reasonable expectation for

Art Unit: 1795

success, is likely to be obvious to a person of ordinary skill in the art. See *KSR International Co. v. Teleflex Inc.*, 550 U.S., 82 USPQ2d 1385, 1395 – 97 (2007) (see MPEP § 2143, E.).

Regarding claim 21, a gas-liquid separation pipe that guides the moisture content discharged from the fuel cell stack to the water tank is not recited; however, it is inherent to the system that such a pipe exists as Surampudi teaches that the water conveyed through a solid-electrolyte membrane is condensed within a water recovery system and is sent to a water tank (page 7, lines 26-29). Surampudi does not teach that it is arranged to allow moisture content from the fuel cell stack to flow down gravitationally, but as a pump is not disclosed it is inherent to the system that this is the case. Also, even if it was not arranged in such a manner, it is within the ambit of a person of ordinary skill in the art to rearrange the gas-liquid separation pipe in this manner (see MPEP 2144.04).

Regarding claim 25, Surampudi teaches that the gas-liquid separator which isn't illustrated must be disposed between the fuel cell stack 7 and the heat exchanger 37 (see the rejection of claim 18). As such, this would allow for the gas-liquid separator to be arranged below the fuel tank and circulation tank ("circulation tank").

Regarding claim 26, Surampudi teaches that the gas-liquid separator is disclosed to be below the fuel tank; however, it is within the ambit of a person of ordinary skill in the art to rearrange the parts and locate the gas-liquid separator above the fuel tank rendering the claim obvious (See MPEP 2144.04).

Regarding claim 27, Surampudi teaches that the valves 904 and 912 are arranged to supply methanol fuel from the fuel tank and water from the water tank to the circulation tank 906 ("aqueous tank"), respectively. It is not recited whether the water tank is arranged below the

Art Unit: 1795

gas-liquid separator; however, it is within the ambit of a person of ordinary skill in the art to arrange the parts in this manner (see MPEP § 2143, E.).

Regarding claim 28, Surampudi teaches that the water tank 908 and the methanol tank 900 are arranged at a common vertical level as shown in figure 9 and they are positioned next to one another in that there is nothing between the two constituents.

Regarding claim 29, Surampudi does not recited whether or not the heat exchanger is arranged below the fuel tank and the circulation tank (“aqueous solution tank”); however, it is within the ambit of a person of ordinary skill in the art to arrange the parts in this manner (see MPEP § 2143, E.).

Regarding claim 30, Surampudi does not recited whether or not the heat exchanger is located above the fuel cell stack; however, figure 2 shows the heat exchanger mostly above the fuel cell stack. Even if it is considered below the fuel cell stack or in the plane of the fuel cell stack, it is within the ambit of a person of ordinary skill in the art to arrange the parts in this manner (see MPEP § 2143, E.).

Regarding claim 31, figure 9 of the Surampudi reference illustrates that the fuel cell stack 924 is arranged at a bottom portion of the direct methanol fuel cell system.

6. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Surampudi as applied to claims 13-21 and 25-31 above, and further in view of Carter et al. (US Patent Application 2003/0020581 A1) (hereinafter “Carter”).

Regarding claim 22, Surampudi teaches a methanol tank 900 and a circulation tank 906 (“aqueous solution tank”) that could be rearranged so as to sit side by side (see the rejection of

Art Unit: 1795

claim 15). Surampudi does not teach that the fuel tank includes a side surface provided with a first fitting and that the aqueous solution tank includes a side surface provided with a second fitting adapted to mate with the first fitting; however, this type of mating mechanism is well known as shown by Carter. Carter teaches a tank with a locking mechanism allowing it to attach to a transformer (paragraph 9). It would be obvious to a person of ordinary skill in the art to attach the fuel tank and circulation tank using the method used by Carter as this allows for the two components to be latched together (Carter).

7. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Surampudi as applied to claims 13-21 and 25-31 above, and further in view of McCoy (US Patent Application 2002/0076581 A1).

Regarding claim 23, Surampudi teaches a water flowing hole 954 ("drain pipe") coming off of the water tank 950 which drains superfluous water when needed. The water flowing hole is controlled by the control device 914 and is only sometimes needed (page 23, lines 31-35). A "cap" that is attachable and detachable is not specifically recited but such a constituent is inherent to the system as the water flowing hole 954 is set up so as to only drain the water when it is in excess. Also, it is well known in the art to use caps on drain pipes as documented by McCoy. McCoy teaches drain pipes 23 and 27 with caps 24 and 28, respectively (paragraph 16).

8. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Surampudi as applied to claims 13-21 and 25-31 above, and further in view of Mankins (US Patent Application 6,564,823 B1) (hereinafter "Mankins").

Regarding claim 24, Surampudi teaches a water flowing hole 954 ("drain pipe") coming off of the water tank 950 which drains superfluous water when needed. The water flowing hole is controlled by the control device 914 and is only sometimes needed (page 23, lines 31-35). Surampudi does not teach that the drain pipe is flexible and has a pivotable discharging end; however, Mankins teaches a drain pipe that contains a pivotal connection of the head to the shaft where the shaft member is flexible (column 9, 4th paragraph).

It would be obvious to a person of ordinary skill in the art to adapt the pivotable, flexible drain pipe of Mankins to the system of Surampudi to allow movement of the drain pipe (Mankins). It is also within the ambit of a person of ordinary skill in the art to locate the end above an upper surface of the fuel cell stack (see MPEP 2143).

9. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Surampudi as applied to claims 13-21 and 25-31 above, and further in view of Miyamoto et al. (US Patent 7,374,832 B2) (hereinafter "Miyamoto").

Regarding claim 32, Surampudi illustrates in Figure 9 that the fuel cell and compressor 26 are disposed in a bottom portion of the direct methanol fuel cell system, but that the water tank is disposed higher up. Surampudi does not disclose whether or not the fuel cell stack is arranged at a central vertical location. Again, as all constituents of the claims are recited by Surampudi, it is within the ambit of a person of ordinary skill in the art to rearrange the parts in the manner recited in the claims (see MPEP 2143). To demonstrate this Miyamoto teaches a similar system in which the air pump is disposed in a bottom portion of the direct methanol fuel cell system below the fuel cell stack and that the fuel cell stack is arranged at an approximately

Art Unit: 1795

central vertical location in the direct methanol fuel cell system. Miyamoto does not teach a water tank; however Surampudi does teach this and it would be obvious to combine the water tank of Surampudi to the system of Miyamoto in order to provide a separate place for the water to go in addition to the methanol aqueous solution container. It would also be obvious to place the water tank below the fuel cell stack.

A rationale to support a conclusion that a claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art. See *KSR International Co. v. Teleflex Inc.*, 550 U.S., 82 USPQ2d 1385, 1395 (2007) (see MPEP §§ 2143 and 2143.02).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMANDA BARROW whose telephone number is (571)270-7867. The examiner can normally be reached on 7:30am-5pm EST. Monday-Friday, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1795

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AMANDA BARROW/  
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/  
Supervisory Patent Examiner, Art Unit 1795